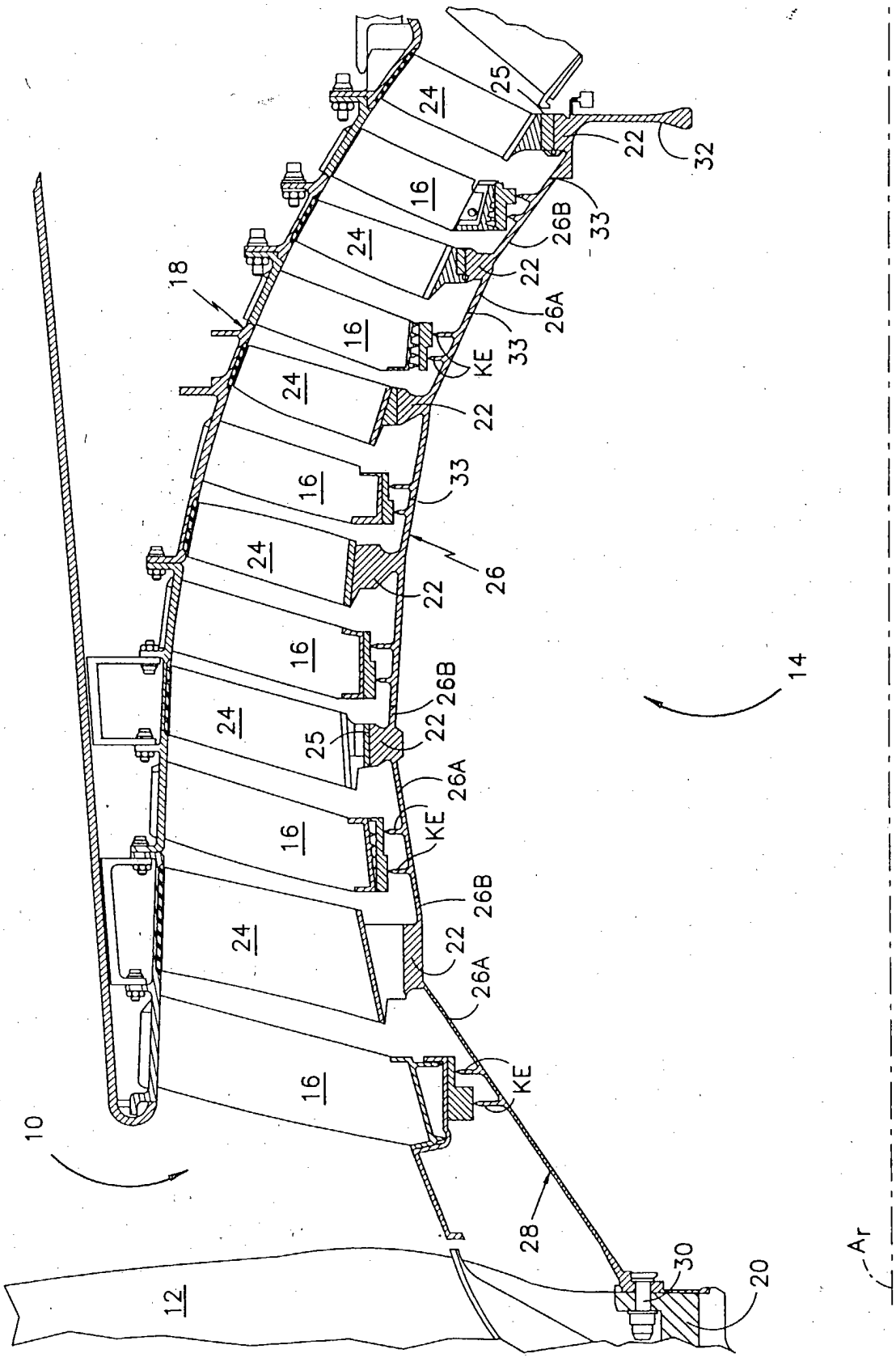
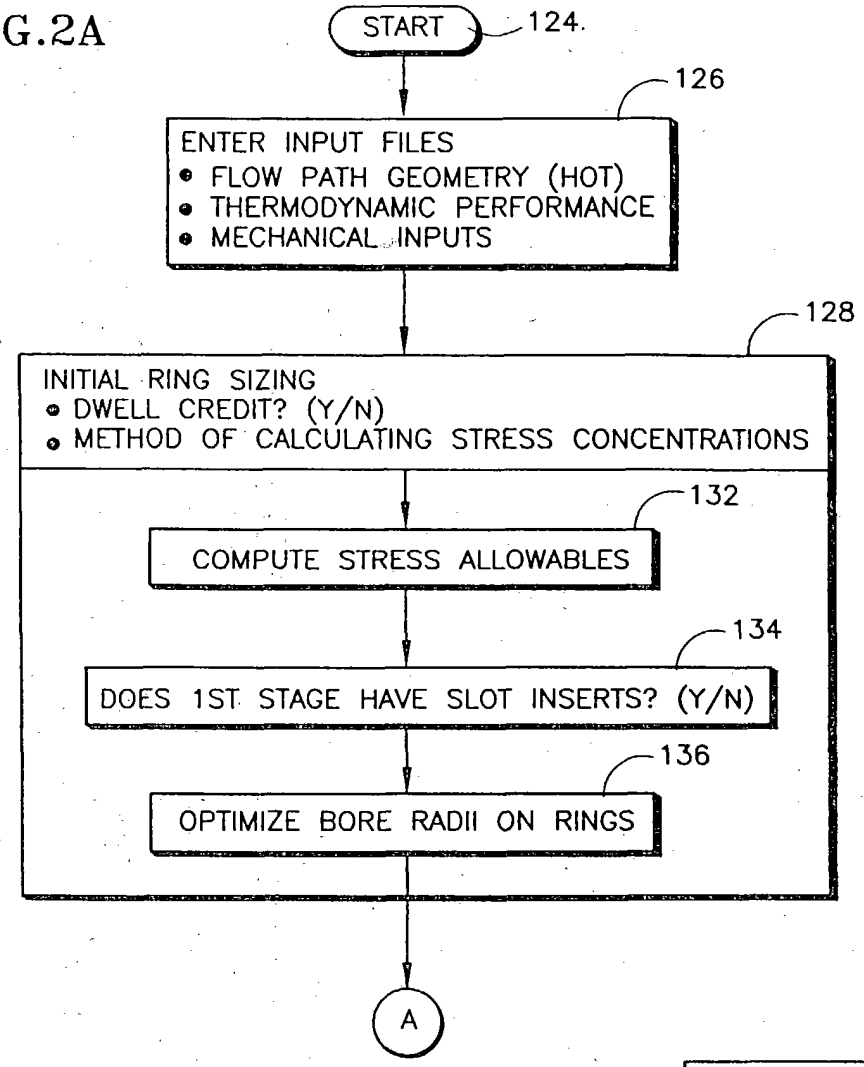


FIG.1

FIG.2A


START
124
126
ENTER INPUT FILES
• FLOW PATH GEOMETRY (HOT)
• THERMODYNAMIC PERFORMANCE
• MECHANICAL INPUTS
128
INITIAL RING SIZING
• DWELL CREDIT? (Y/N)
• METHOD OF CALCULATING STRESS CONCENTRATIONS
132
COMPUTE STRESS ALLOWABLES
134
DOES 1ST STAGE HAVE SLOT INSERTS? (Y/N)
136
OPTIMIZE BORE RADII ON RINGS
A

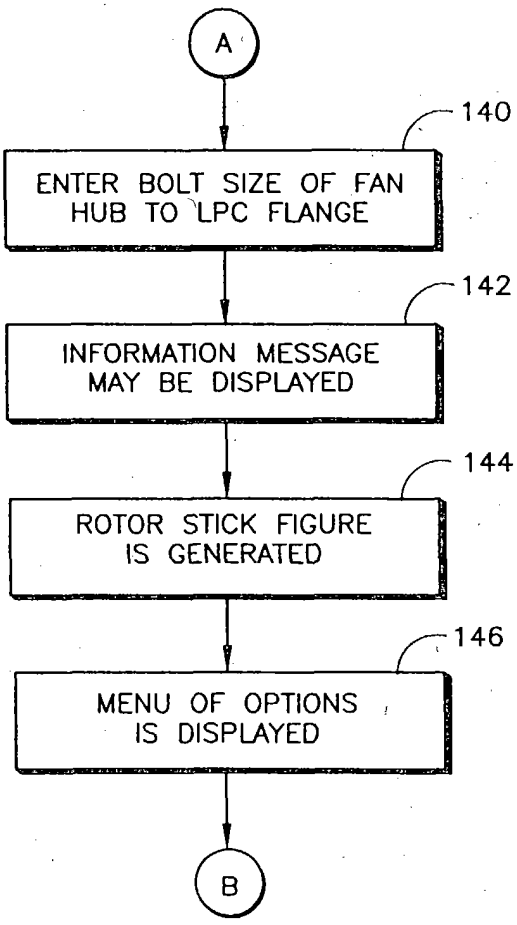

A
140
ENTER BOLT SIZE OF FAN HUB TO LPC FLANGE
142
INFORMATION MESSAGE MAY BE DISPLAYED
144
ROTOR STICK FIGURE IS GENERATED
146
MENU OF OPTIONS IS DISPLAYED
B

FIG.2B

FIG.2C

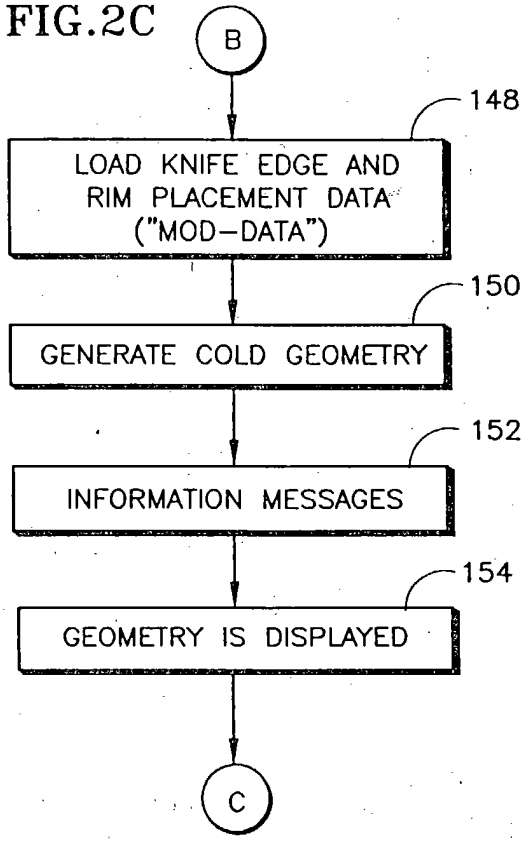


FIG.2D

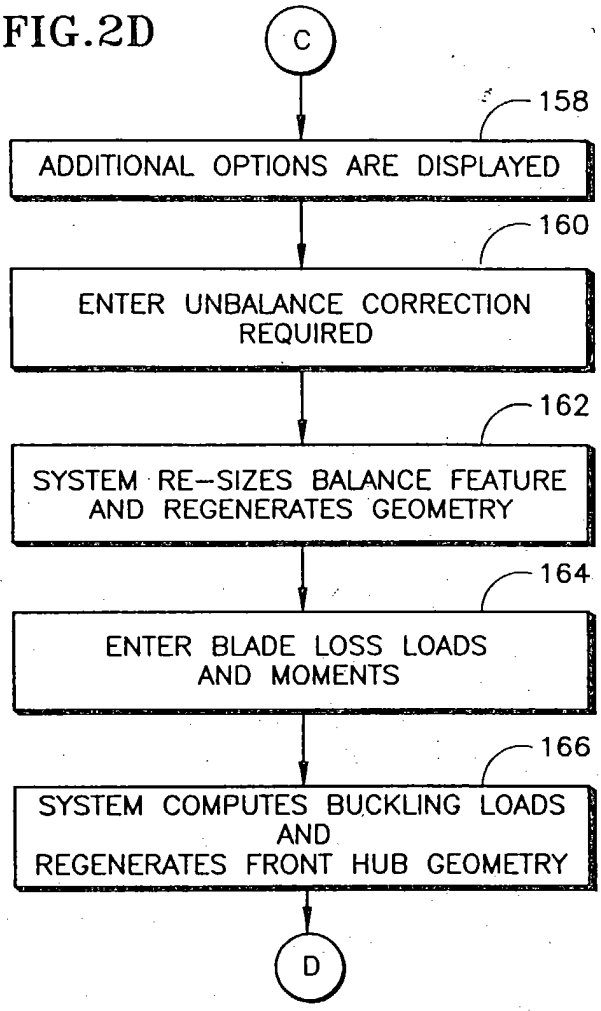


FIG.2E

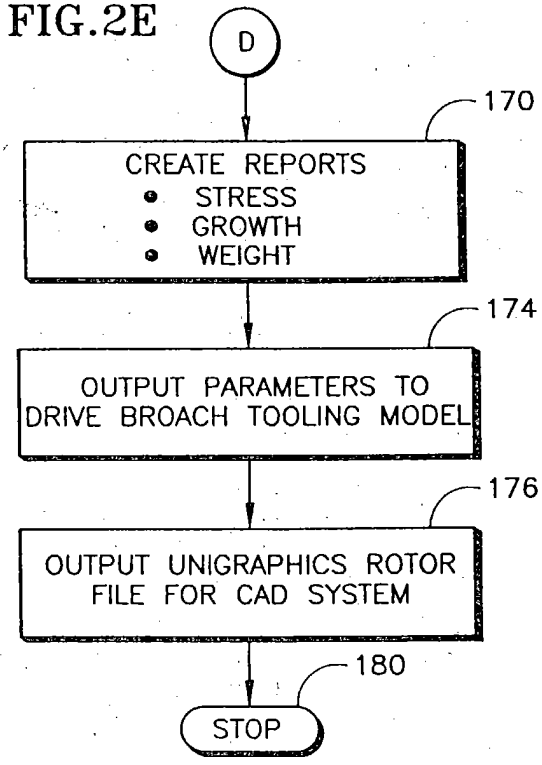


FIG.3

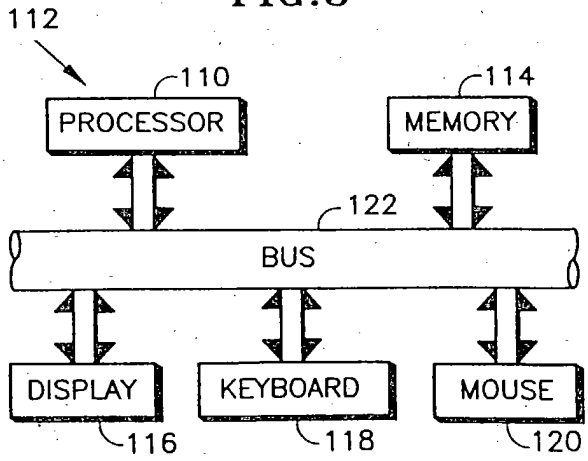
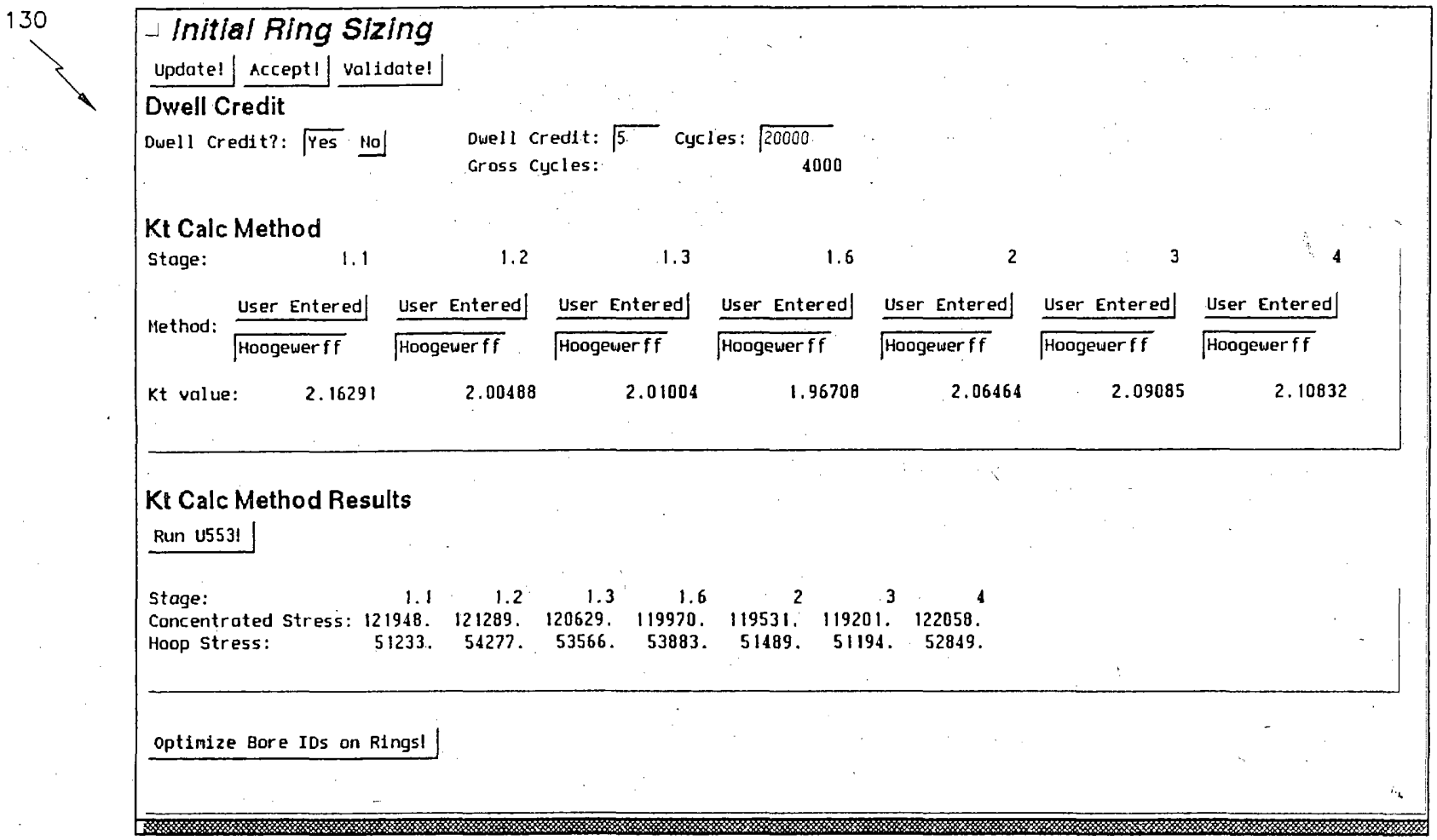


FIG.4


130
Initial Ring Sizing
Update!
Accept!
Validate!
Dwell Credit
Dwell Credit?: Yes No
Dwell Credit: 5
Cycles: 20000
Gross Cycles: 4000
Kt Calc Method
Stage: 1.1 1.2 1.3 1.6 2 3 4
Method: User Entered Hoogewerff
Kt value: 2.16291 2.00488 2.01004 1.96708 2.06464 2.09085 2.10832
Kt Calc Method Results
Run U553!
Stage: 1.1 1.2 1.3 1.6 2 3 4
Concentrated Stress: 121948. 121289. 120629. 119970. 119531. 119201. 122058.
Hoop Stress: 51233. 54277. 53566. 53883. 51489. 51194. 52849.
Optimize Bore IDs on Rings!

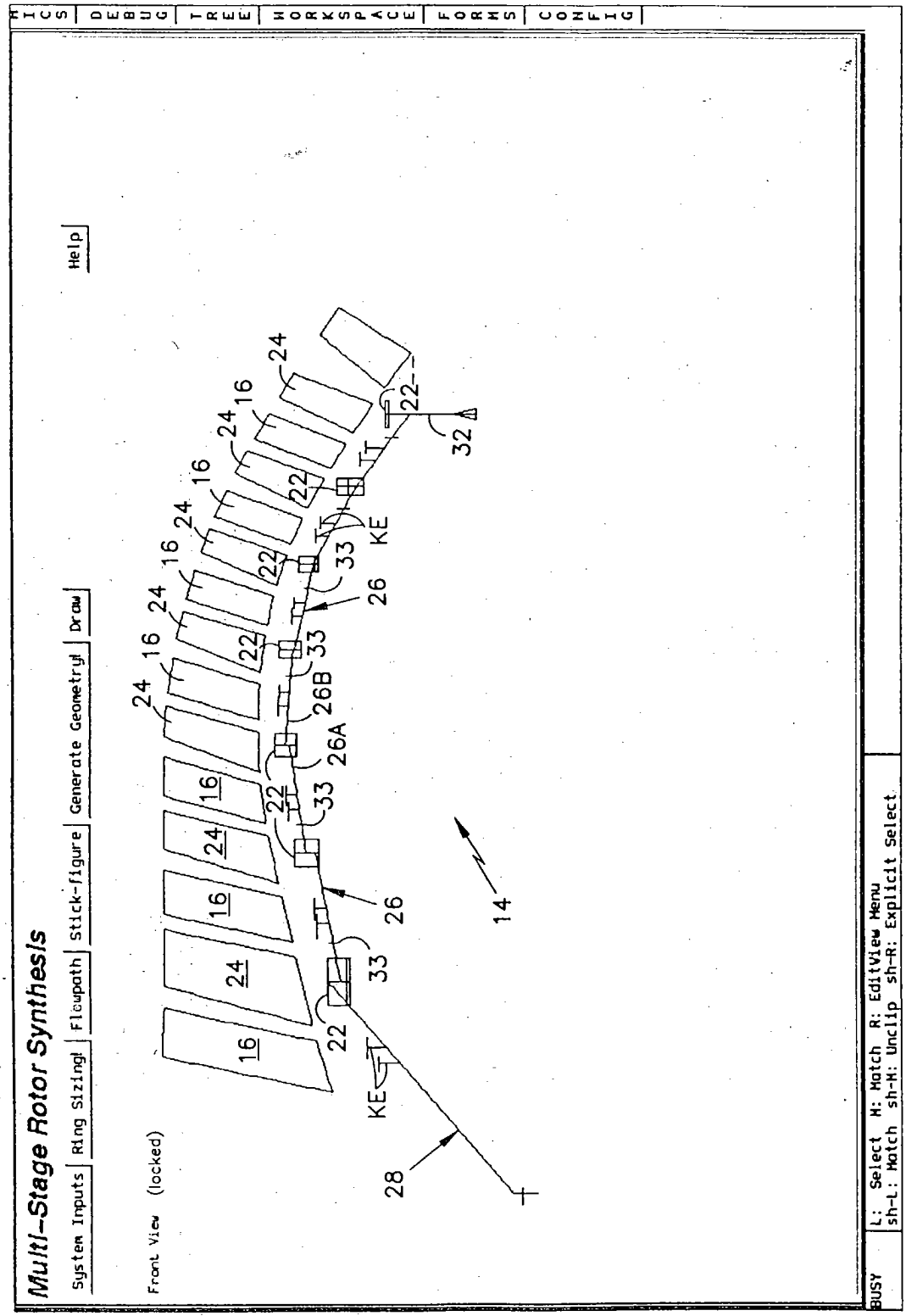

Multi-Stage Rotor Synthesis
System Inputs
Ring Sizing
Flowpath
Stick-figure
Generate Geometry
Draw
Help
Front View (locked)
BUSY
L: Select M: Match R: EditView Menu
sh-L: Match sh-M: Unclip sh-R: Explicit Select
KE
26
26A
26B
28
32
33
14
16
22
24

FIG.5

FIG.6A

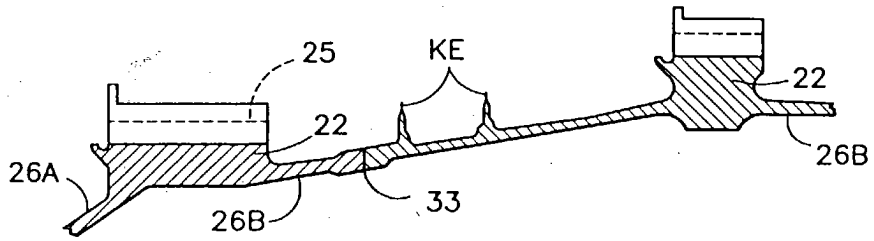


FIG.6B

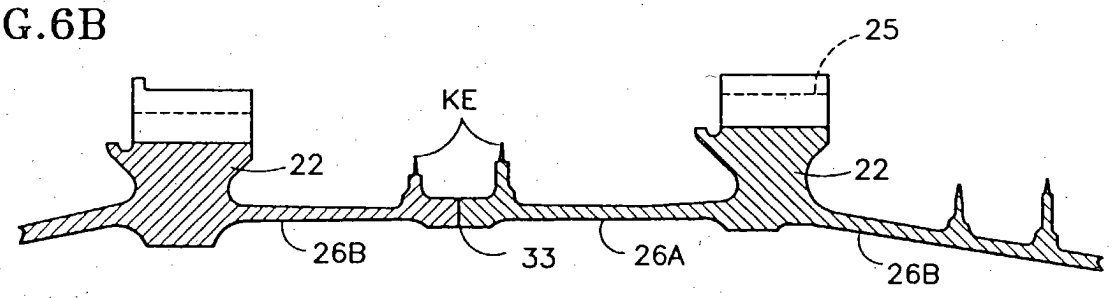
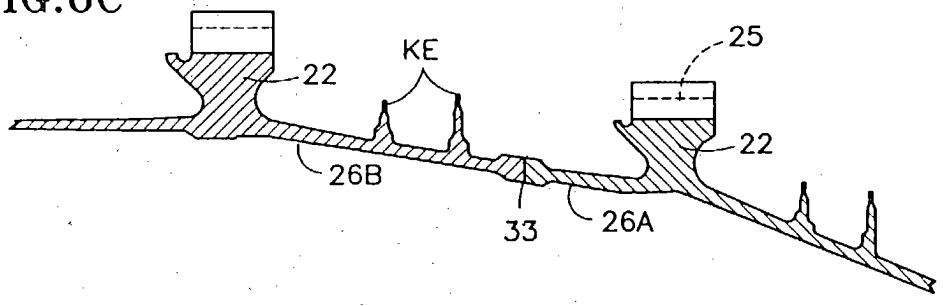


FIG.6C



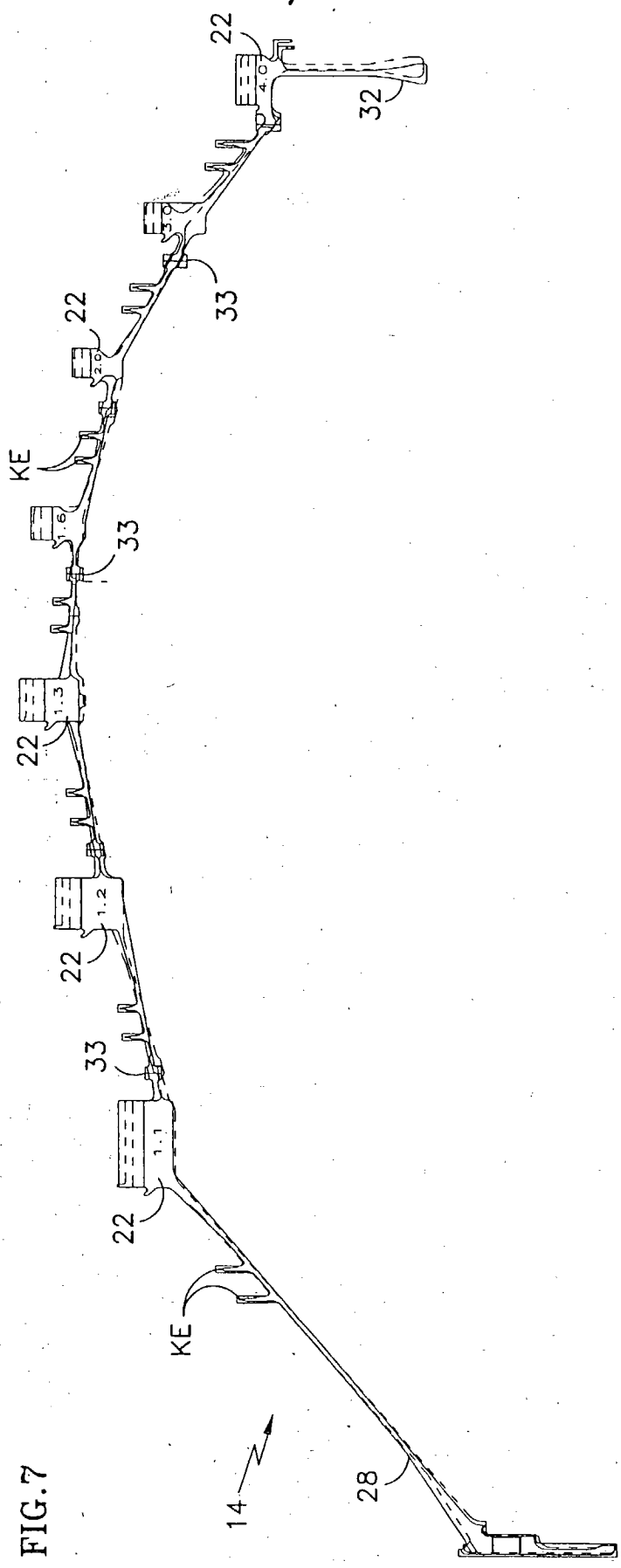
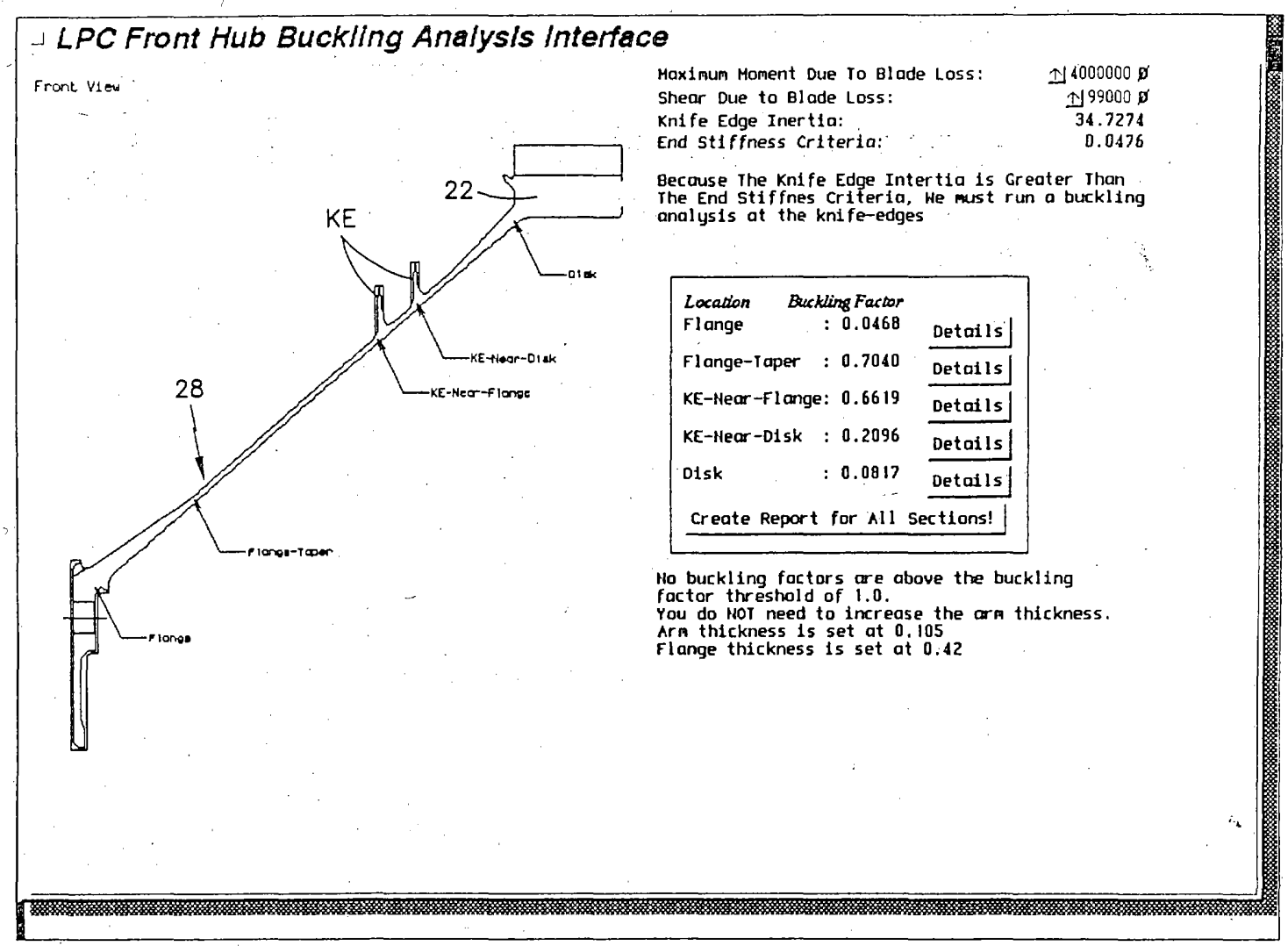


FIG.7

FIG.8


LPC Front Hub Buckling Analysis Interface
168
Front View
22
KE
Disk
KE-Near-Disk
KE-Near-Flange
28
Flange-Taper
Flange
Maximum Moment Due To Blade Loss: 4000000 ø
Shear Due to Blade Loss: 99000 ø
Knife Edge Inertia: 34.7274
End Stiffness Criteria: 0.0476
Because The Knife Edge Intertia is Greater Than The End Stiffnes Criteria, We must run a buckling analysis at the knife-edges
Location Buckling Factor
Flange : 0.0468 Details
Flange-Taper : 0.7040 Details
KE-Near-Flange: 0.6619 Details
KE-Near-Disk : 0.2096 Details
Disk : 0.0817 Details
Create Report for All Sections!
No buckling factors are above the buckling factor threshold of 1.0.
You do NOT need to increase the arm thickness.
Arm thickness is set at 0.105
Flange thickness is set at 0.42

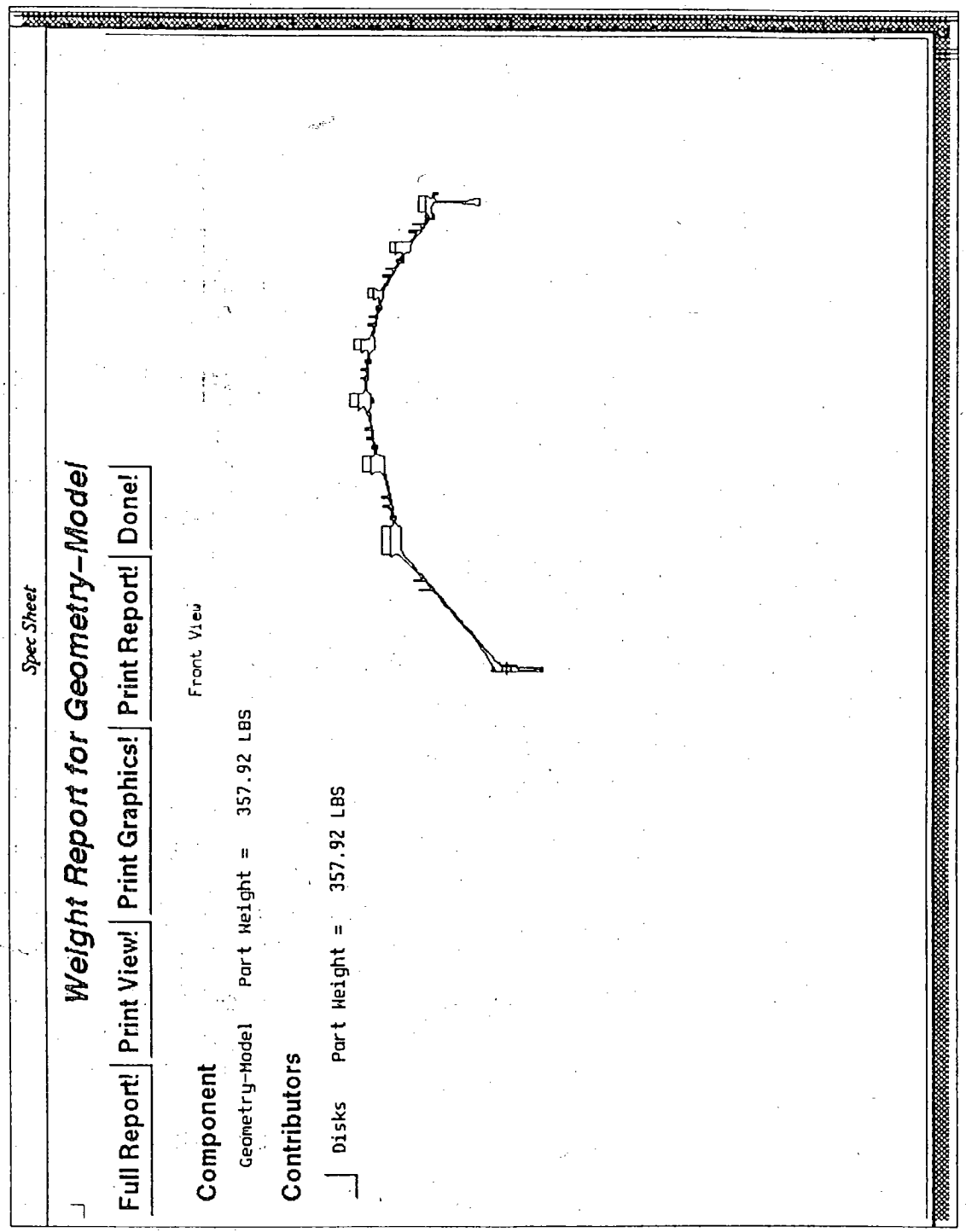
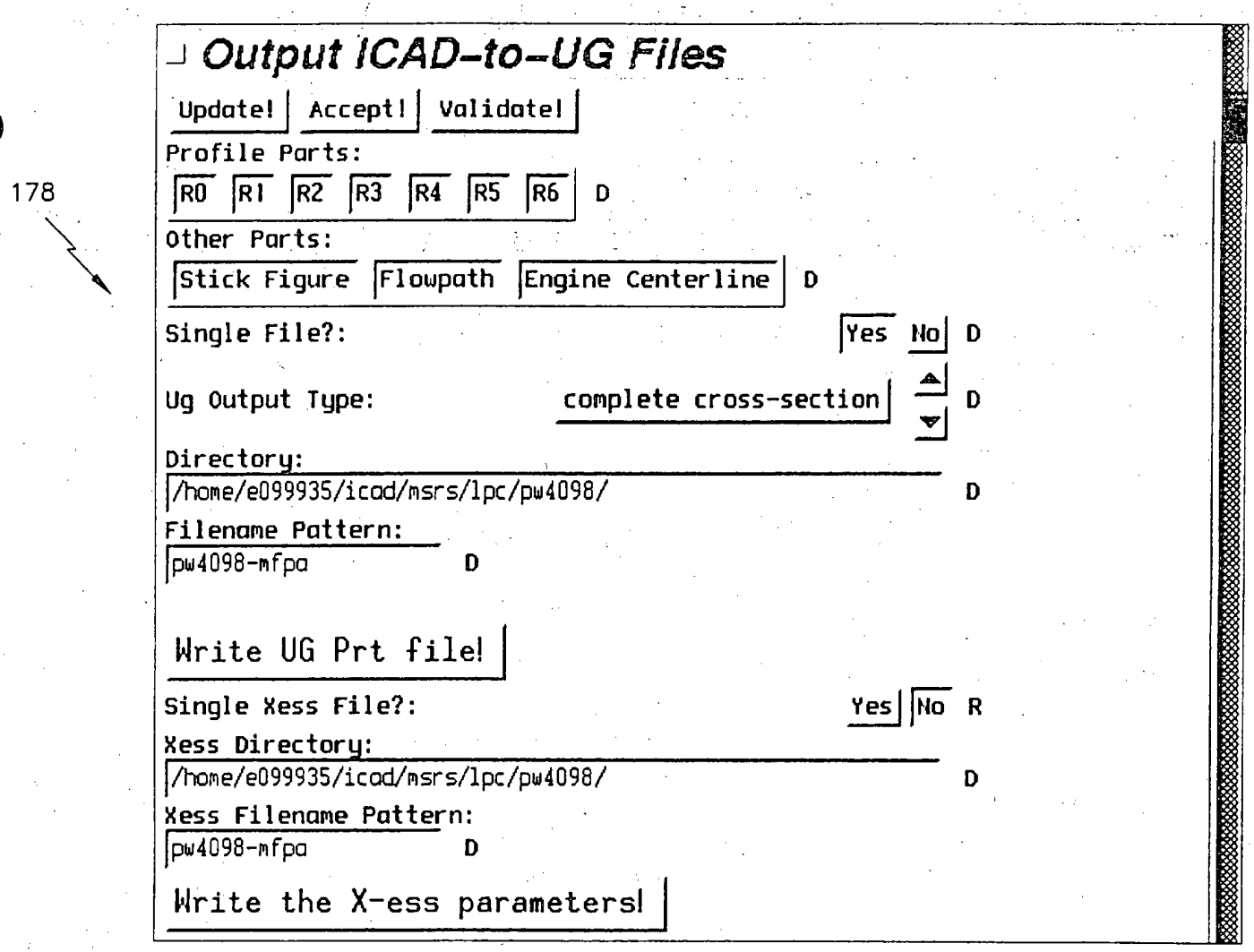

Spec Sheet
Weight Report for Geometry-Model
Full Report!
Print View!
Print Graphics!
Print Report!
Done!
Component
Geometry-Model Part Weight = 357.92 LBS
Front View
Contributors
Disks Part Weight = 357.92 LBS
172

FIG.9

FIG.10


178
Output ICAD-to-UG Files
Update!
Accept!
Validate!
Profile Parts:
R0
R1
R2
R3
R4
R5
R6
D
Other Parts:
Stick Figure
Flowpath
Engine Centerline
D
Single File?:
Yes
No
D
Ug Output Type:
complete cross-section
D
Directory:
/home/e099935/icad/msrs/lpc/pw4098/
D
Filename Pattern:
pw4098-mfpa
D
Write UG Prt file!
Single Xess File?:
Yes
No
R
Xess Directory:
/home/e099935/icad/msrs/lpc/pw4098/
D
Xess Filename Pattern:
pw4098-mfpa
D
Write the X-ess parameters!